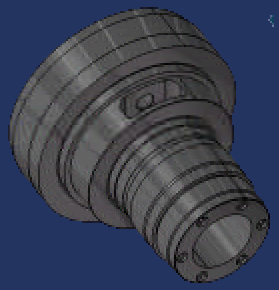
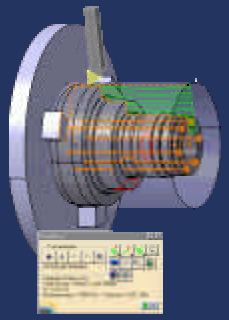
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NC Manufacturing







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Tutorial Objectives

Demo Description

- This tutorial illustrates Manufacturing integration with other CATIA products.

Product Demo (LMG / PMG)

Messages

- Integration with CATIA V5 modelling and other products ensures a high level of associativity
- Intuitive and easy-to-use User Interface allows tight integration between Tool Path definition, verification and generation
- Seamless NC data generation thanks to an integrated Post Processor Access solution

Targets – Market segments

- CATIA V5 customers with need for Lathe & 2.5 axis machining

Duration

- 60 minutes

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Tutorial Major Steps

Here are the major steps of the scenario:

Step 1

- Read V5 CATProduct
- Define Part Operation

Step 2

- Define Lathe Operation

Step 3

- Define Pocketing Operation

Step 4

- Import and apply Drilling Process

Step 5

- Replay Machining Operations
- Video Simulation

Step 6

- Generate HTML Documentation
- Generate APT File



Note: in the ..\NC-Manufacturing\Data directory you can find the file “Final.CATProcess” and load it if you have difficulties during the tutorial.

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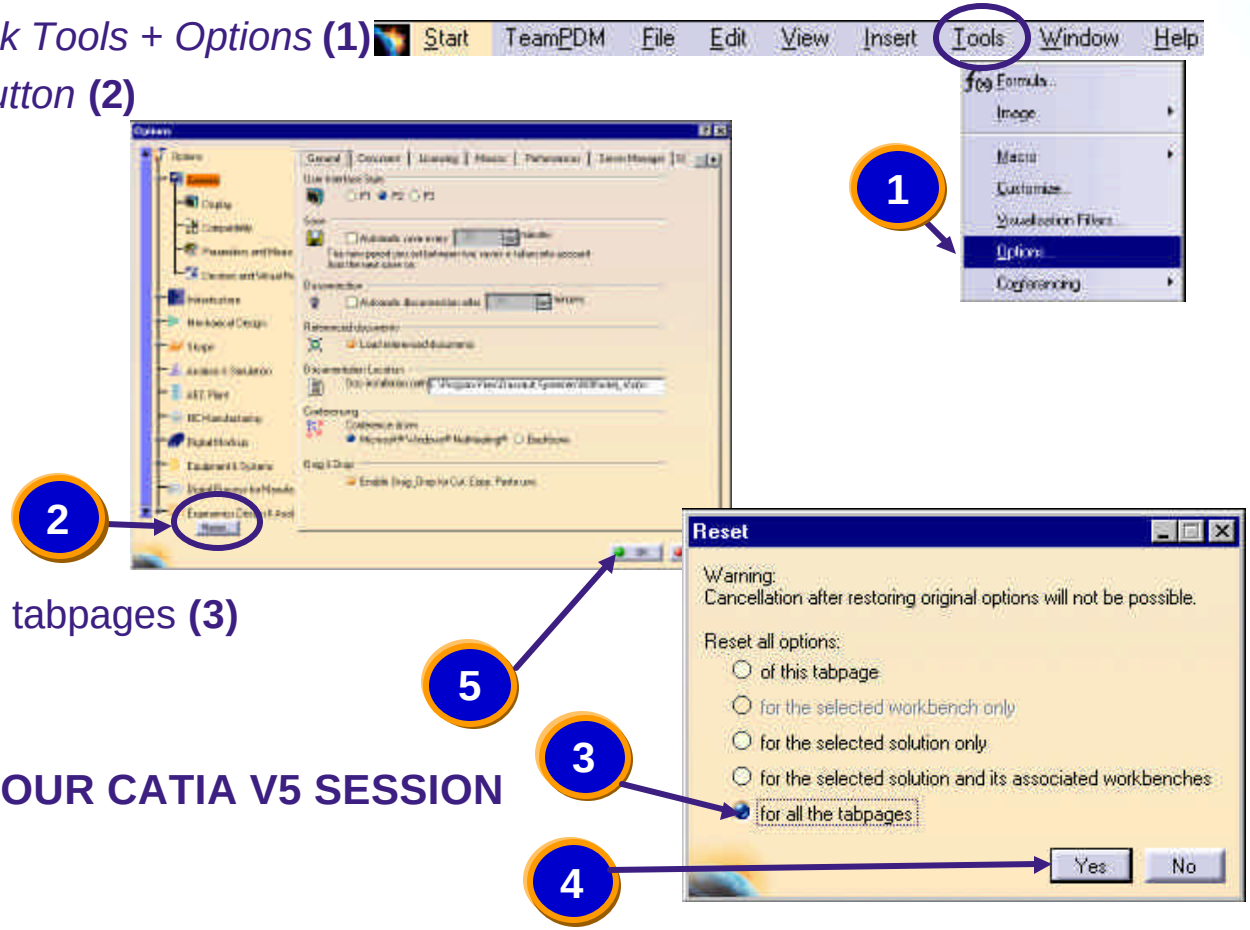
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Settings 1/3

Depending on your needs, you may have to modify the CATIA V5 settings (*units, default directory, visualisation parameters, etc*…)

In order to use the appropriate settings for this tutorial, you have to:

- **LAUNCH YOUR CATIA V5 SESSION**
 - *In menu bar click Tools + Options* **(1)**
 - *Click* Reset*… button* **(2)**



 - *Check* for all the tabpages **(3)**
 - *Click* Yes **(4)**
 - *Click* OK **(5)**
 - **RE-LAUNCH YOUR CATIA V5 SESSION**

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Settings 2/3

For this tutorial you also need to install a tooling and a material catalogue:

- **Tooling Catalogue:**
 - *Copy the file **MyCatalog.Catalog** (Located in ..\NC-Manufacturing\Data directory) in: ..Program Files\Dassault Systemes\intel_a\startup\Manufacturing\Tools*

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Settings 3/3

2. Material Catalogue:

- Do not do this step if you have already done it in getting started or in a previous tutorial

✍ *Copy the ..\Getting Started**Catalog.CATMaterial** file under ..\Program Files\Dassault Systemes\M07\intel_a\startup\materials\French directory*

✍ *Copy the ..\Getting Started**Catalog.CATMaterial** file under ..\Program Files\Dassault Systemes\M07\intel_a\startup\materials\German directory*

✍ *Copy the ..\Getting Started**Catalog.CATMaterial** file under ..\Program Files\Dassault Systemes\M07\intel_a\startup\materials\Japanese directory*

✍ *Copy the ..\Getting Started**Catalog.CATMaterial** file under ..\Program Files\Dassault Systemes\M07\intel_a\startup\materials directory*

✍ *Answer Yes in order to replace the old catalogue*

You are now ready to launch your CATIA V5 session

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Step 1: Read the CATProduct

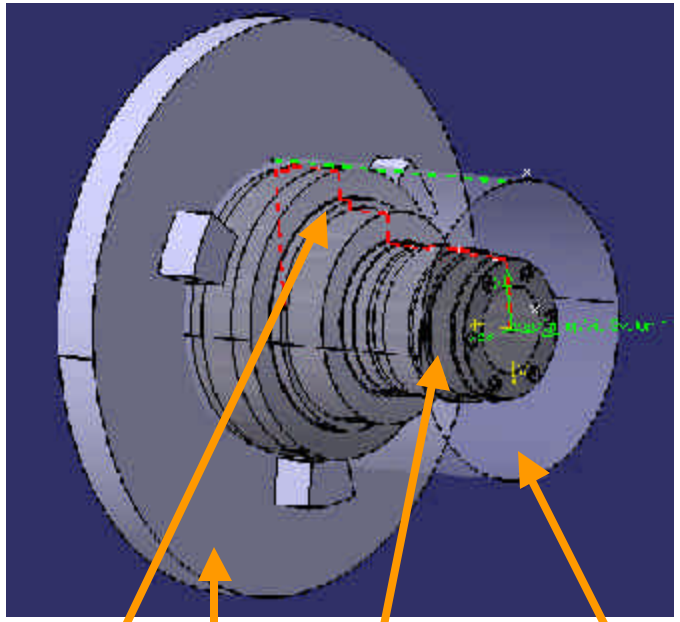


Read V5 CATProcess

- File/Open…
 - *Select in the directory Data the CATProcess :*

 Initial.CATProcess

The product level includes the Design Part, the stock, the Tooling and other Geometry.



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Step 1: Start Manufacturing

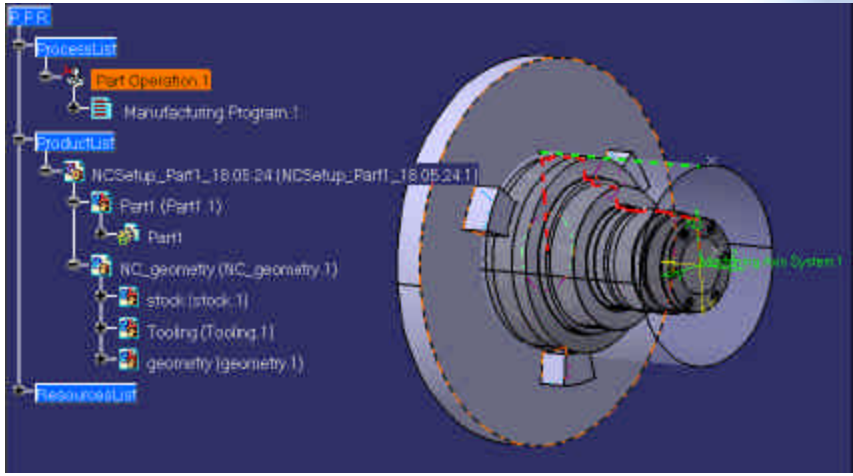
Lathe or 2.5axis Machining



Access to the Lathe Machining Workbench

- *The PPR Tree is displayed in the left of the CATIA Window*
- *Process : The Part Operation & NC Cycles*
- *Product : The Geometry necessary for NC such as Stock, Part, Fixtures, Machine-Tool table, Safety Planes, Starting points, …*
- *Resources : The shop floor resources such as Tools and Machine-tools*

The Process / Product / Resources model will be shared by all the Manufacturing applications (such as NC, Robotic, Welding, Painting, Inspection, etc…) and can be accessed by a Process Planning Management tool (Digital Process for Manufacturing) to manage all the manufacturing applications



The PPR Tree

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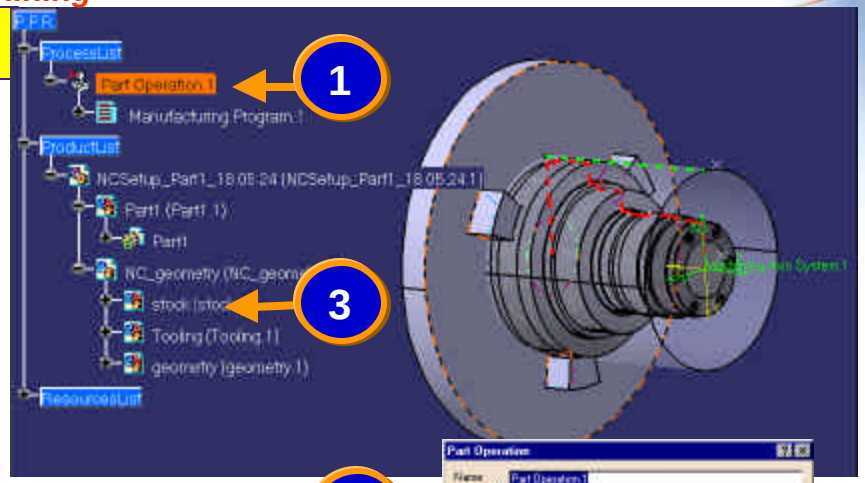
Step 1: Define the Part Operation

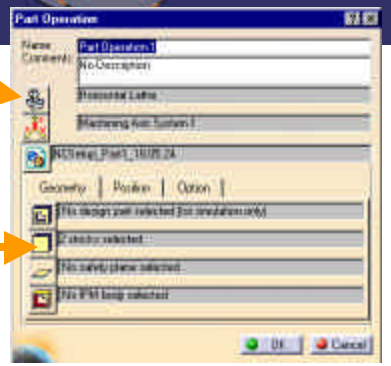
Lathe Machining

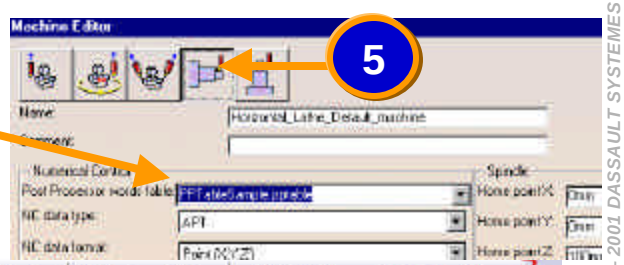


Define parameters of the Part Operation

- Define the Stock
 - *Double-click on the Part Operation.1 to edit it (1)*
 - *Click on Stock icon (2)*
 - *Select Stock and Tooling in the PPR Tree to select and double click out of the part to validate it (3)*
- Define the Machine
 - *Click on Machine icon (4)*
 - *Select Horizontal Lathe (5)*
- Define the PPWords Table
 - *Select the Lathe .pptable (6)*
 - *Click OK*







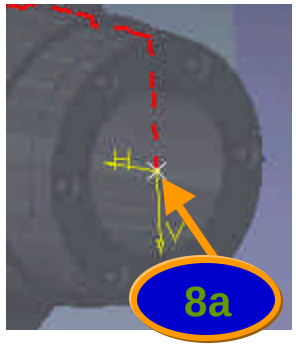
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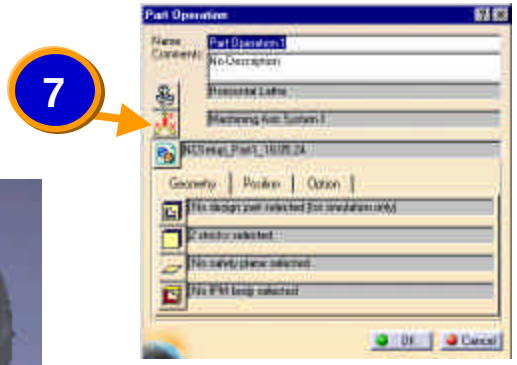
Step 1: Define the Part Operation

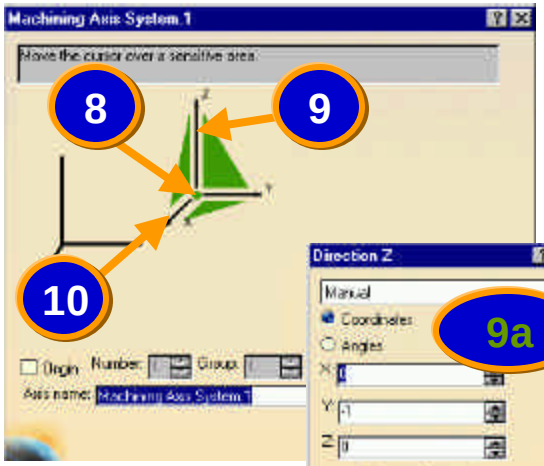


- Define the Lathe Machining Axis System
 - *Click on Reference Machining Axis System icon (7)*
 - *Select the origin point in the panel (8) and select the centre point of the stock (8a)*
 - *Select the Z axis in the panel (9) and key 0,-1,0 as spindle orientation (9a)*
 - *Click OK*
 - *Select the X axis in the panel (10) and key 0,0,-1 as spindle orientation (10a)*
 - *Click OK*
 - *Click OK*
 - *Click OK in Part Operation Window*













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Step 2: 1st MO : Roughing 1/2

Lathe Machining

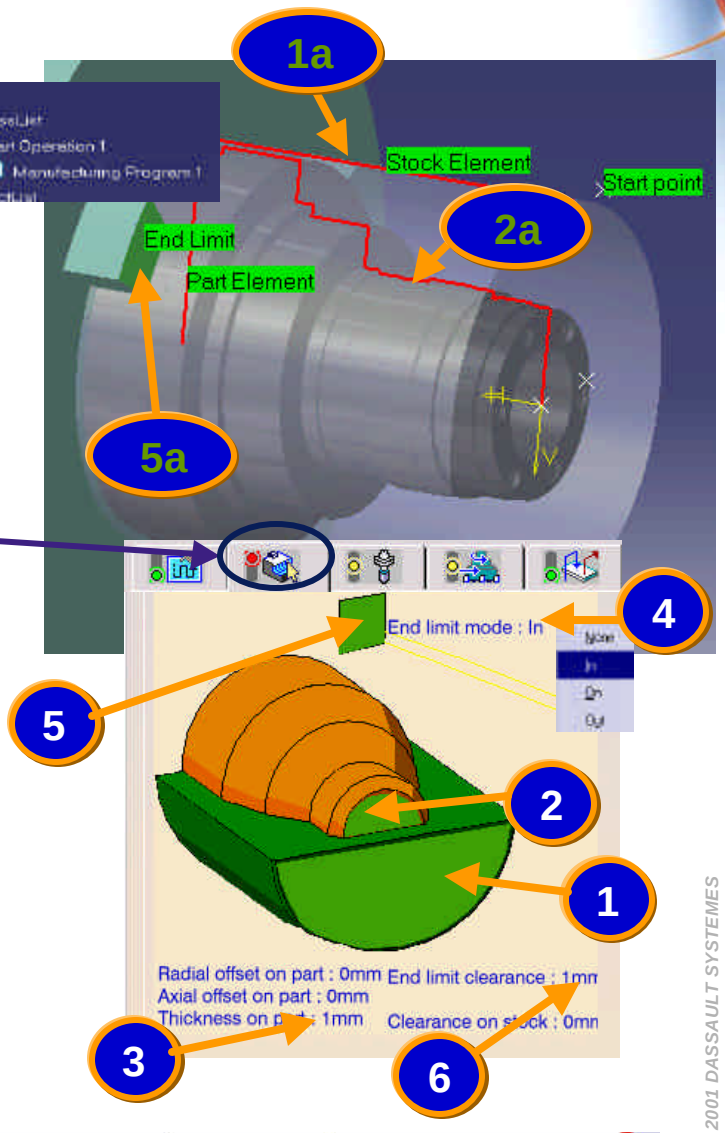


Define a Roughing Operation (1/2)

- *Extend Part Operation tree and select Manufacturing Program.1*
- *Click on Roughing icon (the first in the toolbar)*

Define the geometry to machine

- *Select Geometry Tabpage*
- *Select the stock in the panel (1)*
- *Double click on the edge on the stock (1a)*
- *Select the Part element in the panel (2)*
- *Double click on a point of the profile on the Part in order to select the whole profile (2a)*
- *Double click on “Thickness on part” (3)*
- *key 1mm and click OK*
- *M3 (mouse button 3) on End limit mode and select “in” (4)*
- *Select the End limit geometry in the panel (5)*
- *Click on the indicated element (fixture surface) in the part (5a)*
- *Double click on End Limit Clearance (6)*
- *Key 1mm and click OK*



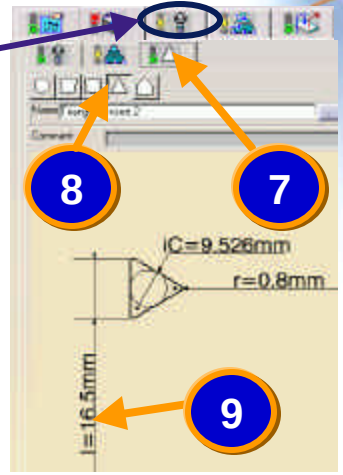
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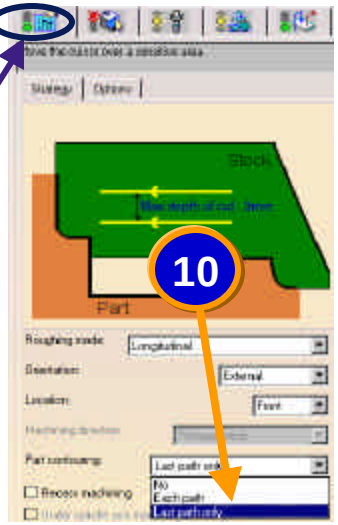
Step 2: 1st MO : Roughing 2/2

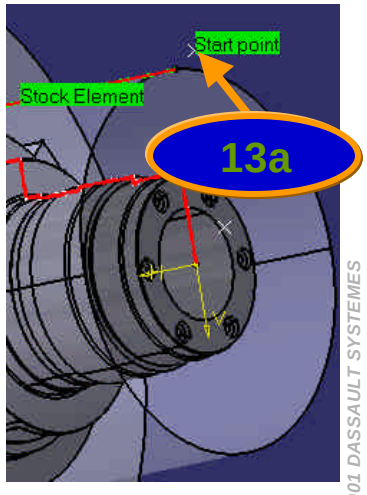


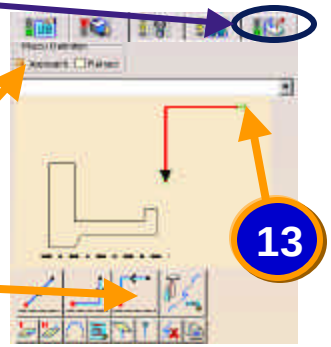
Define a Roughing Operation (2/2)

- Define the tool
 - *Select tool tabpage*
 - *In Insert tab page (7) :*
 - Select triangular insert (8)
 - Double click on l parameter (9)
 - Key 8 and click OK
- Define the strategy to machine
 - *In strategy tab page :*
 - Add a part contouring at the last path only (10)
- Define the macro
 - *Select Macro Tabpage*
 - *tag approach macro (11)*
 - *Select predefine macro (12)*
 - *Define the start point :*
 - Click on start point in the panel (13)
 - Select the Start point on the part (13a)
 - Click OK to validate Roughing Operation



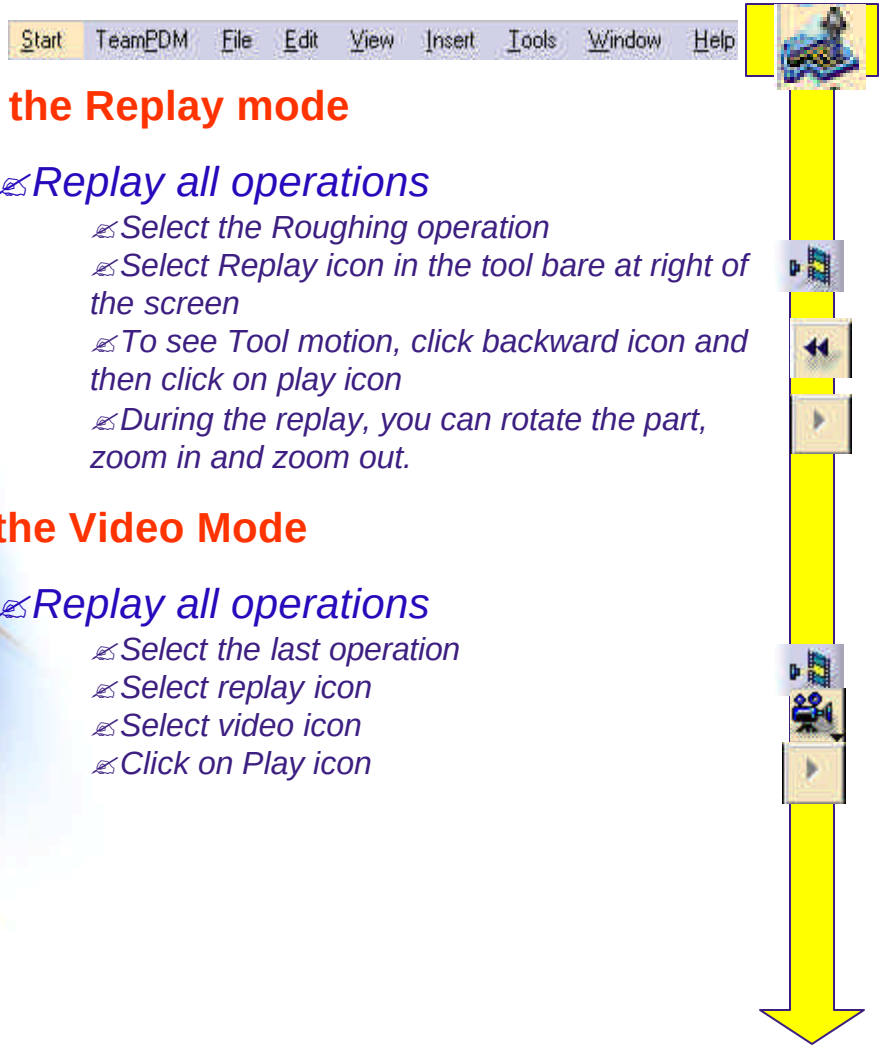






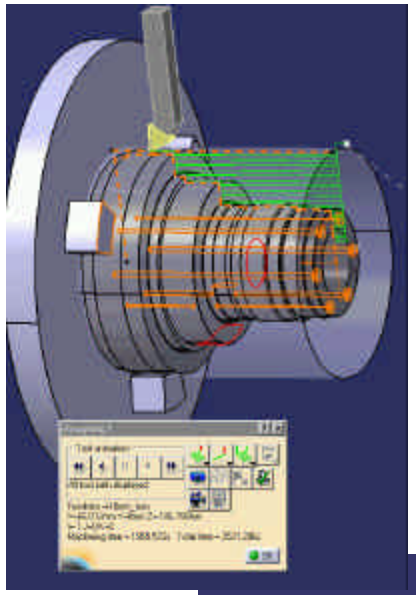
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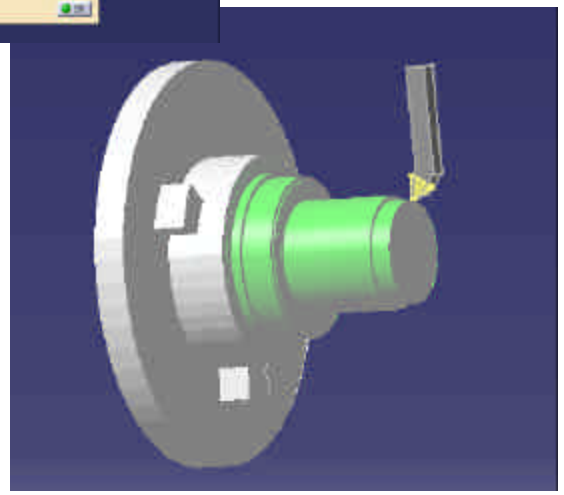
Step 2: Replay Roughing Operation



- **Run the Replay mode**
 - *Replay all operations*
 - *Select the Roughing operation*
 - *Select Replay icon in the tool bare at right of the screen*
 - *To see Tool motion, click backward icon and then click on play icon*
 - *During the replay, you can rotate the part, zoom in and zoom out.*

- **Run the Video Mode**
 - *Replay all operations*
 - *Select the last operation*
 - *Select replay icon*
 - *Select video icon*
 - *Click on Play icon*







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Step 3: 2nd MO : 2.5 axis Operation 1/3



Go to PMG WorkBench

- *Start/NC Manufacturing/Prismatic Machining*
- *Click on No Show icon*
- *Select the stock on the part (1)*

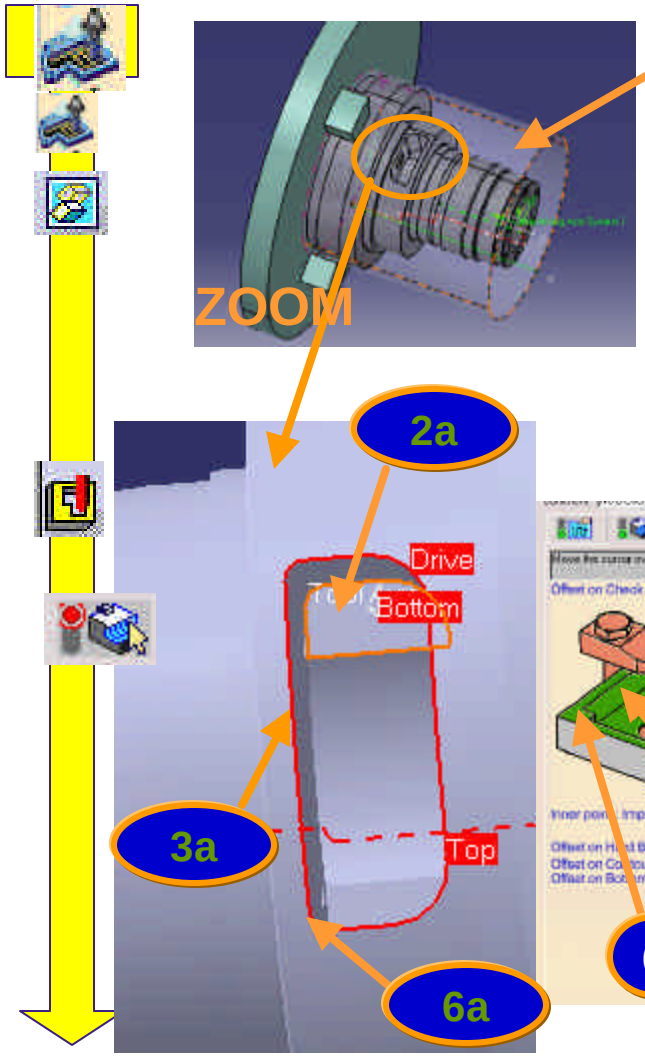
Define a Pocketing Operation

Create Pocketing Operation

- *Select Roughing Operation in the tree to insert Pocketing Operation*
- *Select Pocketing icon*

Define the geometry to machine

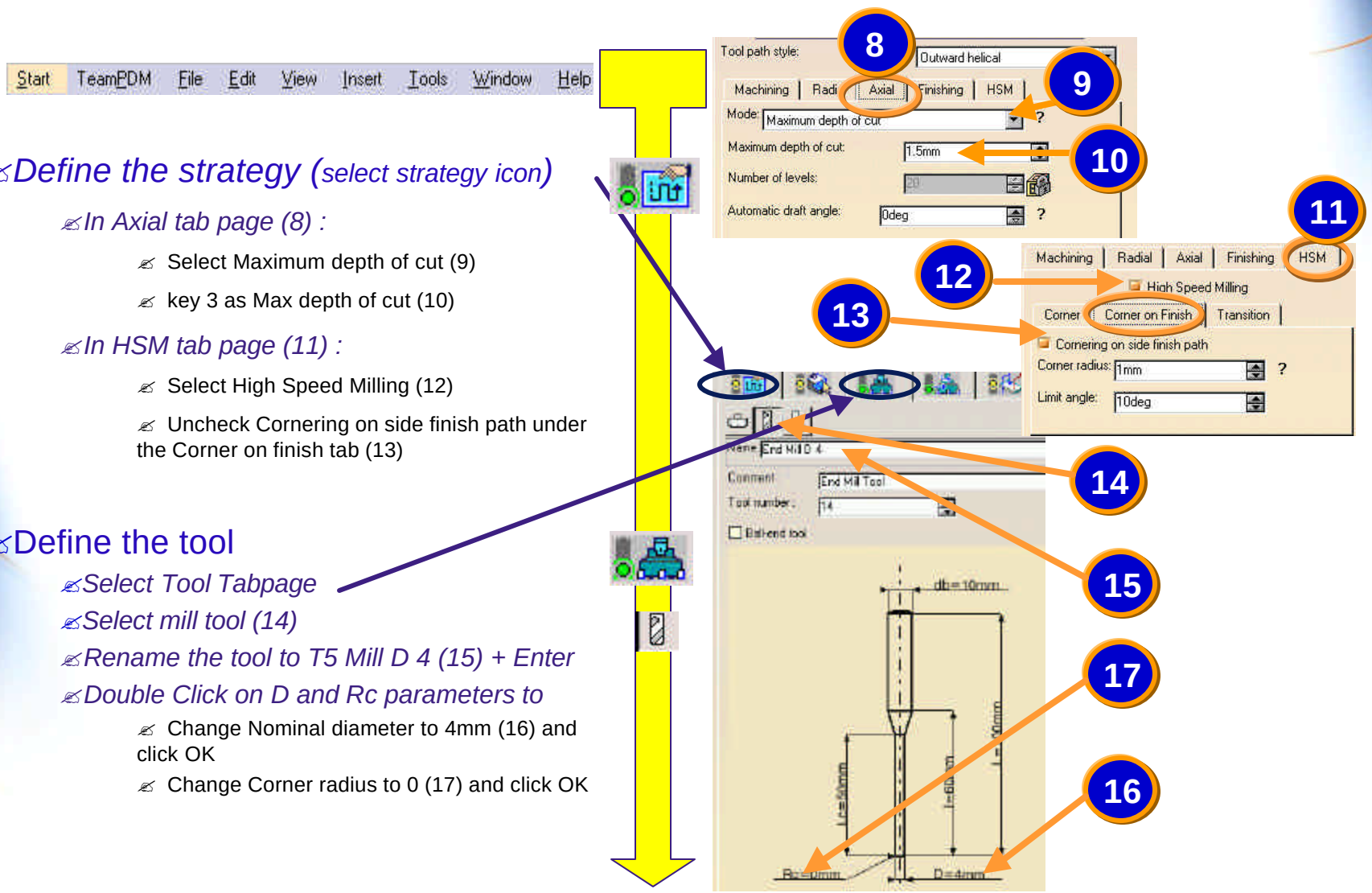
- *Select the Bottom in the panel (2) and on the part (2a)*
- *In the same way select the guide (3), reset all selection (4), select line (3a) and click propagate (5) then click OK*
- *Select Top on definition windows (6) and click selected point on geometry (6a)*
- *Double click on "Offset on top" (7)*
- *Key 3mm and click OK*



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Step 3: 2nd MO : 2.5 axis Operation 2/3

- *Define the strategy (select strategy icon)*
 - *In Axial tab page (8) :*
 - Select Maximum depth of cut (9)
 - key 3 as Max depth of cut (10)
 - *In HSM tab page (11) :*
 - Select High Speed Milling (12)
 - Uncheck Cornering on side finish path under the Corner on finish tab (13)
- Define the tool
 - *Select Tool Tabpage*
 - *Select mill tool (14)*
 - *Rename the tool to T5 Mill D 4 (15) + Enter*
 - *Double Click on D and Rc parameters to*
 - Change Nominal diameter to 4mm (16) and click OK
 - Change Corner radius to 0 (17) and click OK

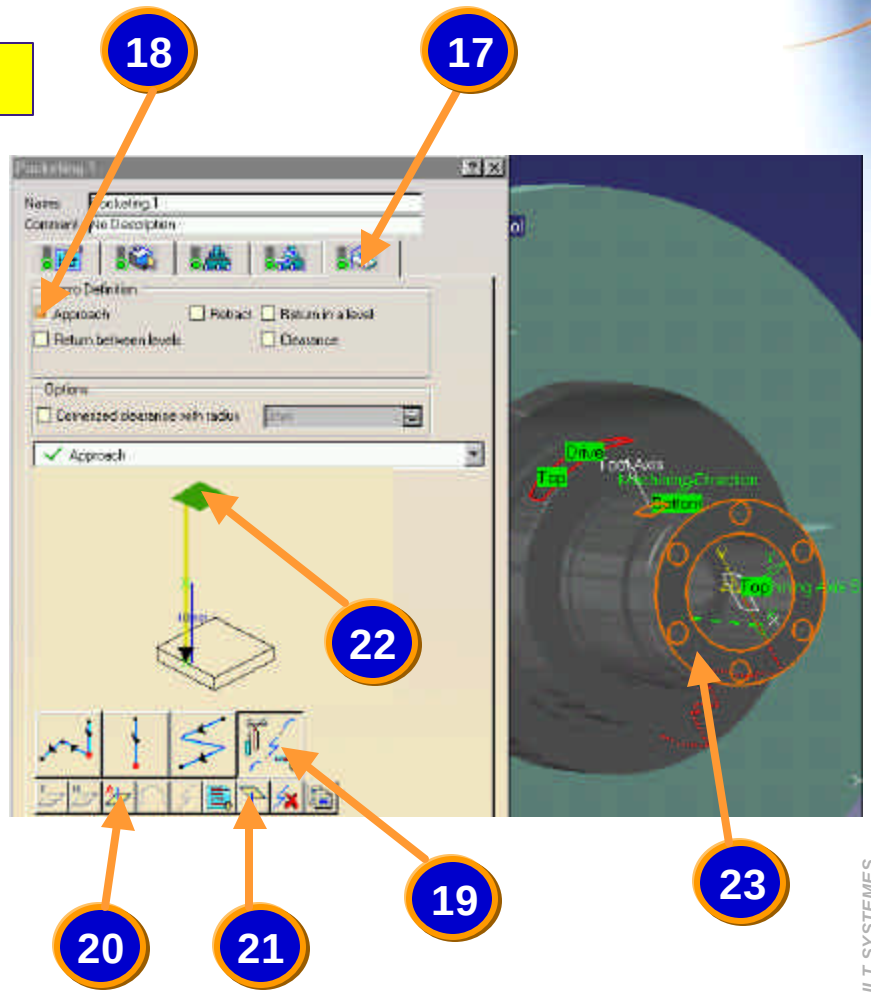


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Step 3: 2nd MO : 2.5 axis Operation 3/3

Start | TeamPDM | File | Edit | View | Insert | Tools | Window | Help

- Define the Macro
 - *Select Macro Tabpage (17)*
 - *Tag Approach case (18)*
 - *Select “Built macro” button (19)*
 - *Select “axial” macro icon(20)*
 - *Select “up to plane” macro (21)*
 - *Click on the plane (22)*
 - *Select the following surface (23)*
 - *Click OK*



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Step 4: 3rd MO : Drilling Process



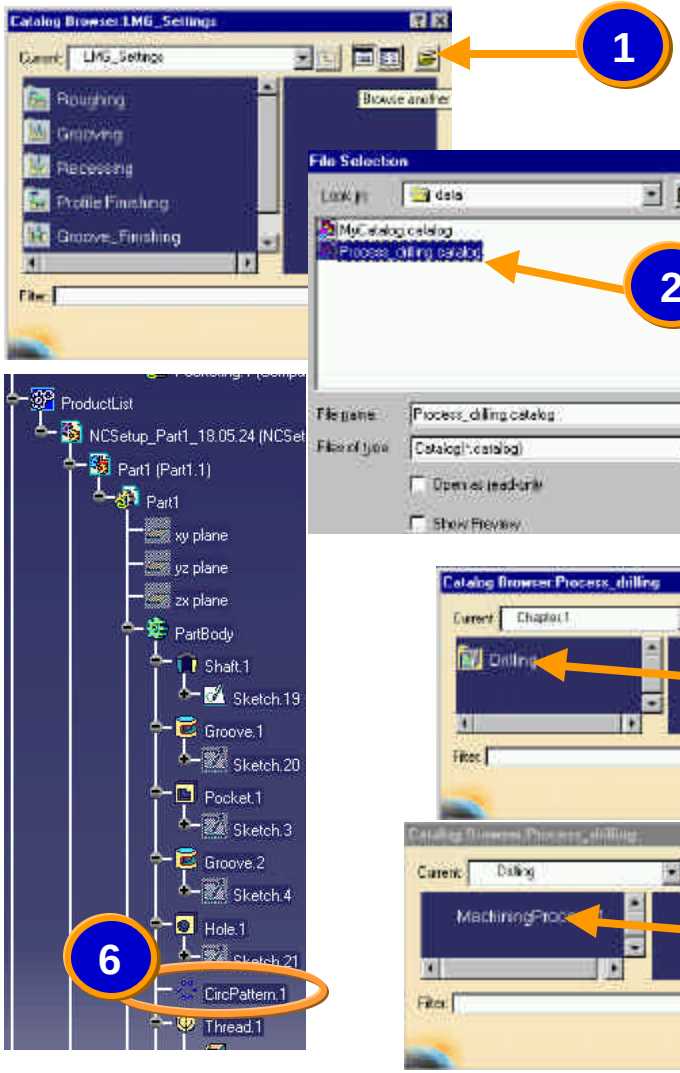
Import a Drilling Process

Access to the Catalog

- *Select Catalog icon (in the tool bar, named "Auxiliary View", at the bottom of the screen)*
- *Select "Browse another Catalog" icon (1)*
- *Select Process_drilling.catalog File in …/data/ directory (2)*
- *Click Open (3)*

Apply Process

- *Double click on Drilling (4)*
- *Double Click on Machining Process (5)*
- *Expand the Part1 Tree and select CircPattern.1 in PartBody (6)*
- *Select the last Machining Operation in the ProcessList tree (pocketing)*
- *Click OK (7)*



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Step 5: Replay

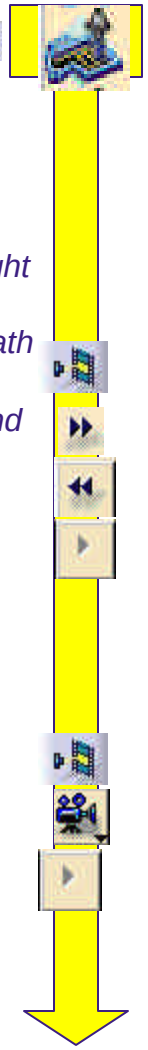


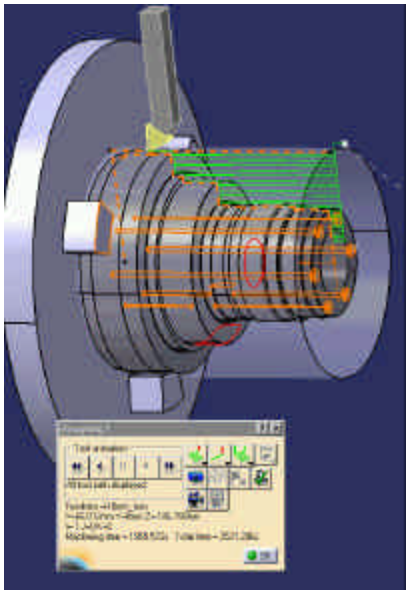
Run the Replay mode

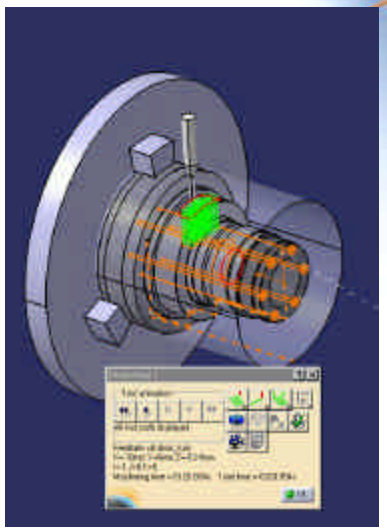
- Replay all operations
 - Select the first Machining Program
 - Select Replay icon in the tool bar on the right of the screen
 - Select “Forward Replay” icon to see tool path of each operation
 - To see Tool motion, click backward icon and then click on play icon
 - During the replay, you can rotate the part, zoom in and zoom out.

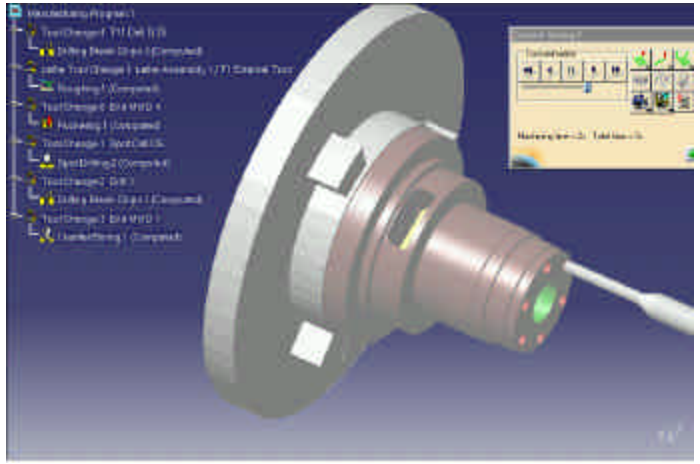
Run the Video Mode

- Replay all operations
 - Select the last operation
 - Select replay icon
 - Select video icon
 - Click on Play icon









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Step 6: Shop Floor Documentation

Prismatic or Lathe Machining



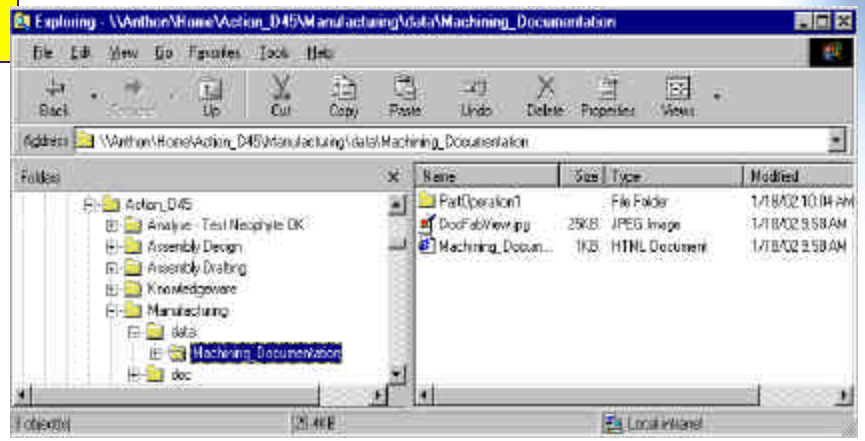
Processing an NC documentation

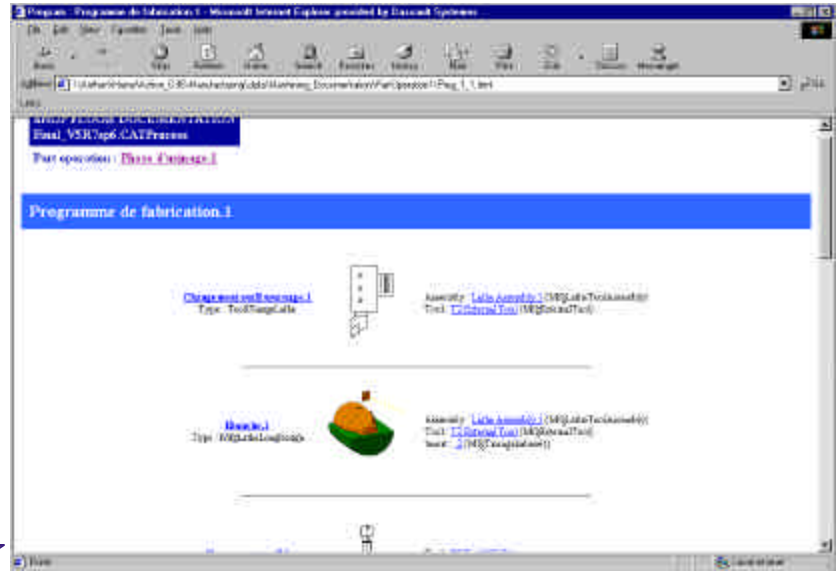
- With these Demo Licences you can generate NC Manufacturing Documentation
- This functionality uses a VBMacro delivered in the standard CATIA Installation

- To directly access the result you can open the file :

Machining_Documentation.htm in ../Manufacturing/Data/machining_documentation directory

NB : To open this file you need an HTML Browser





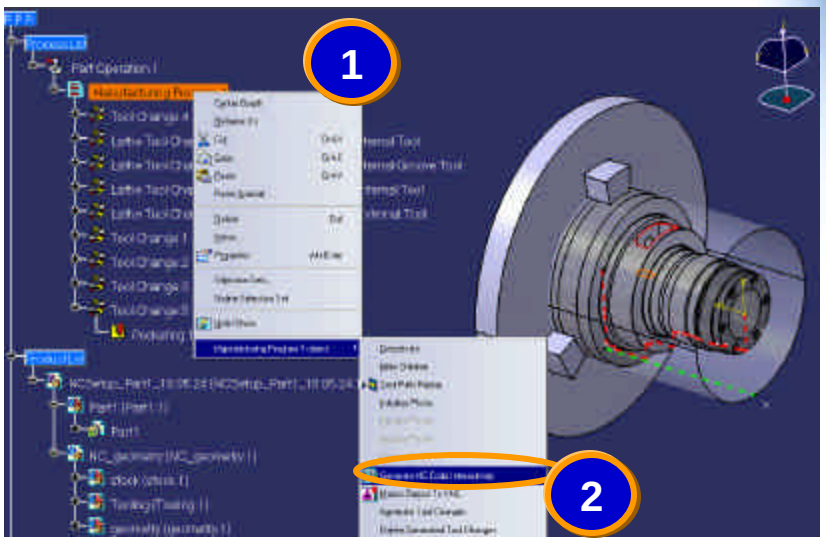
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Step 6: APT Source



Processing an APT Source File

- Processing an APT Source
 - *MB3 on Manufacturing Program.1 and Select "generate NC code interactively" (1-2)*
 - *Define a file name : "APT-code" (3)*
 - *Click on save*
 - The File is saved in ../Manufacturing/Data directory
 - *Open it with a text editor, such as Notepad*
 - *If you don't have a text editor open the Apt-code.pdf file*





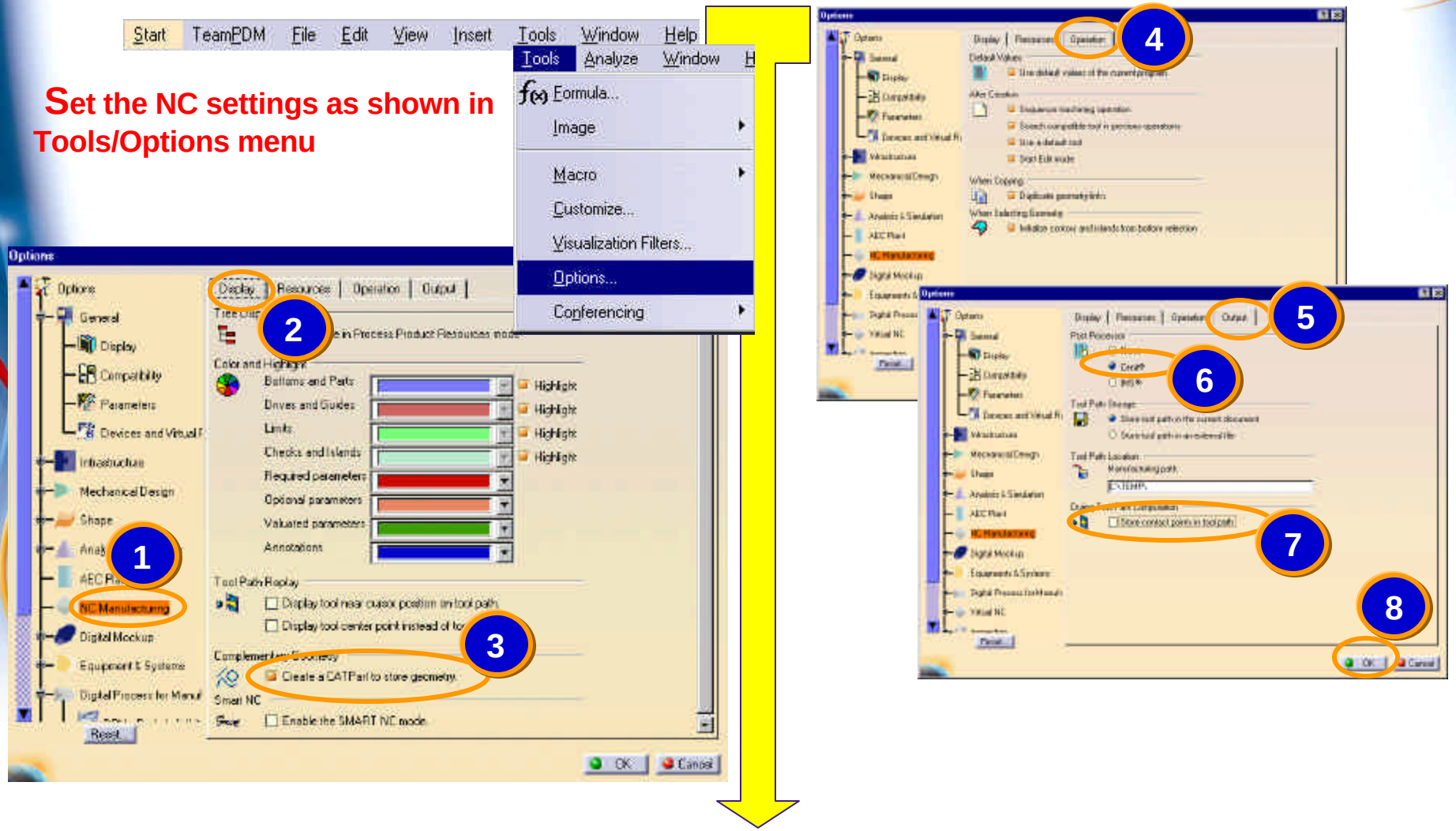
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Manual Settings

Setting the environment

Set the NC settings as shown in Tools/Options menu



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Congratulations